Brucellosis

(Also known as Bangs Disease, Undulant Fever, Malta Fever and Mediterranean Fever)

Report Immediately

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1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Brucellosis is caused by *Brucella* bacteria. The species of *Brucella* which infect humans are *B. abortus, B. melitensis, B. suis,* and rarely, *B. canis.*

B. Clinical Description

The symptoms of brucellosis may be nonspecific, including sustained or irregular fever of variable duration, headache, weakness, sweats, chills, arthralgias, malaise, weight loss, depression and generalized aching. Onset of illness may be acute or insidious. Localized infections of organs (including the liver and spleen) and chronic localized infections can occur. The disease may last for days, months, or occasionally longer if inadequately treated. Relapse is not uncommon. Complications affecting the joints are common, as is genitourinary involvement, including orchitis and epididymitis. The case-fatality rate of untreated brucellosis is $\leq 2\%$. However, death often results from endocarditis caused by *Brucella melitensis*.

C. Reservoirs

Cattle, swine, goats and sheep are the most common reservoirs. Bison, elk, caribou, and some species of deer may also harbor *Brucella* species. *B. canis* is an occasional problem in laboratory dog colonies and kennels; a small percentage of pet dogs and a higher proportion of stray dogs have *B. canis* antibody titers, and coyotes have also been found to be infected.

D. Modes of Transmission

Brucellosis is spread through direct contact (of mucosal surfaces and non-intact skin) with secretions of living or dead infected animals, including their tissues, blood, urine, vaginal discharges, aborted fetuses, and especially placentas. It may also be spread through ingestion of raw milk and dairy products (*e.g.,* unpasteurized cheese) from infected animals. Airborne transmission may occur through inhalation of contaminated aerosols (*e.g.,* in laboratory settings). Persons may also be infected through accidental inoculation with live brucella vaccine-strain used for livestock. Person-to-person spread is extremely rare, although it has been reported to occur through bone marrow transplantation.

E. Incubation period

The incubation period for brucellosis is highly variable, ranging from 5 to 60 days; illness most commonly occurs about 1 month after exposure.

F. Period of Communicability or Infectious Period

Person-to-person transmission of brucellosis is extremely rare.

G. Epidemiology

Humans are accidental hosts, although there is worldwide distribution of brucellosis. It is more commonly seen in farmers, ranchers, veterinarians, and other people who work directly with animals. It may also be found in

people who work in laboratories and slaughterhouses, or as meat inspectors. Sporadic cases and outbreaks may occur among consumers of raw (unpasteurized) milk and milk products, especially soft cheeses. Less than 10% of reported cases occur in children under 19 years of age. Fewer than 120 cases per year are reported in the United States; incidence worldwide may be largely unrecognized and underreported.

H. Bioterrorist Potential

Brucella species are considered potential bioterrorist agents. If acquired and properly disseminated, *Brucella* could cause a serious public health challenge in terms of ability to limit the numbers of casualties and control other repercussions from such an attack.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

- Report any suspicion of brucellosis called to your attention by a healthcare provider or any positive laboratory result pertaining to brucellosis. Also report any suspected exposure to *Brucella* that may be bioterrorist in nature.

Note: See Section 3) C below for information on how to report a case.

B. Laboratory Testing Services Available

The State Laboratory Institute (SLI), Reference Laboratory provides both culture and serologic testing for human clinical specimens. The Reference Laboratory will test clinical specimens for the presence of the bacteria by culture and will also confirm and further identify suspected *Brucella* isolates submitted from outside laboratories. (The Reference Laboratory requests that all laboratories submit *all* isolates cultured for further identification. This additional testing aids in the public health surveillance necessary for this illness.) For more information call the Reference Laboratory at (617) 983-6607. The Enteric Laboratory will perform serologic testing on serum specimens. For more information call the Enteric Laboratory at (617) 983-6607.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To help identify the source of infection and prevent further transmission from this source (*e.g.,* an infected animal, a contaminated unpasteurized dairy product, etc.).
- To identify cases and clusters of human illness that may be associated with a bioterrorist event.

B. Laboratory and Healthcare Provider Reporting Requirements

Please refer to the lists of reportable diseases (at the end of this manual's introductory section) for specific information.

Note: Due to the rarity and potential severity of brucellosis, the Massachusetts Department of Public Health (MDPH) requests that information about any suspect or known case of brucellosis, or any suspected exposure to brucella that may be bioterrorist in nature, be **immediately reported** to the local board of health where diagnosed. If this is not possible, call the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 (weekdays), or (617) 983-6200 (emergency number for nights/weekends). A case of brucellosis is defined by the reporting criteria in Section 2) A above.

C. Local Board of Health Reporting and Follow-up Responsibilities

1. **Reporting Requirements**

MDPH regulations (*105 CMR 300.000*) stipulate that each local board of health (LBOH) must report the occurrence of any case of brucellosis, as defined by the reporting criteria in Section 2) A above. Please refer to

the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

2. **Case Investigation**
   a. **The most important thing a LBOH can do if it learns of a suspect or confirmed case of brucellosis, or any suspected exposure that may be bioterrorist, is to call the MDPH immediately, any time of the day or night.** Daytime phone numbers of the Division of Epidemiology and Immunization are (617) 983-6800 and (888) 658-2850. The phone number for nights and weekends is (617) 983-6200.

   b. Case investigation of brucellosis in Massachusetts residents will be directed by the MDPH Division of Epidemiology and Immunization. If a bioterrorist event is suspected, the MDPH and other response authorities will work closely with LBOHs and provide instructions/information on how to proceed.

   c. Following immediate notification of the MDPH, the LBOH(s) may be asked to assist in investigating cases that live within their community, including gathering the following:
      1) The case's name, age, address, phone number, status (hospitalized, at home, deceased), and parent/guardian information, if applicable.
      2) The name and phone number of the hospital where the case is or was hospitalized.
      3) The name and phone number of the case's attending physician.
      4) The name and phone number of the infection control official at the hospital.
      5) If the patient was seen by a healthcare provider before hospitalization, or was seen at more than one hospital, be sure to document these names and phone numbers as well.

   d. Following immediate notification of the MDPH, the LBOH may be asked to assist in completing an official CDC *Brucellosis Case Surveillance Report* form (in Appendix A). Most of the information required on the form can be obtained from the healthcare provider or the medical record. Use the following guidelines to assist you in completing the form:
      1) Be sure to record the patient's full name, full address date of illness onset, symptom information and therapy information accurately.
      2) Complete diagnostic test information as requested on the form.
      3) Exposure history: use the incubation period range for *Brucella* (5–60 days). Specifically, focus on the period beginning a minimum of 5 days prior to the case's onset date back to no more than 60 days before onset for the following exposures:
         a. Animal contact
         b. Occupation (*e.g.*, farmer, laboratory worker)
         c. Food consumption history (use of raw milk or milk products). Use the second side of the form to record this information.
      4) If you suspect that the case became infected through milk (or other food), use the MDPH *Foodborne Illness Complaint Worksheet* (Appendix A) to facilitate recording additional information. It is requested that LBOHs fax or mail this worksheet to the MDPH Division of Food and Drugs (see top of worksheet for fax number and address). This information is entered into a database, to help link other complaints from neighboring towns, thus helping to identify a foodborne illness outbreak. *This worksheet does not replace the Brucellosis Case Surveillance Report form.*
      5) Ask questions regarding exposure to the *Brucella* vaccine to determine other sources of exposure.
      6) Confirm that the laboratory where the culture was identified exercised the proper precaution when working with the bacteria. Infectious aerosols can occur when manipulation of the isolate is done outside of a biosafety hood. Laboratory workers exposed to these aerosols should take preventive antibiotics. See Section 4) C below.
      7) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the case report form with as much

information as you have gathered. Please note on the form the reason why it could not be filled out completely.

e. After completing the case report form, attach lab report(s) and fax or mail (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The confidential fax number is (617)-983-6813. Call the Surveillance Program at (617) 983-6801 to confirm receipt of your fax. The mailing address is:
MDPH, Division of Epidemiology and Immunization
Surveillance Program, Room 241
305 South Street
Jamaica Plain, MA 02130

f. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4), Controlling Further Spread.

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

None.

B. Protection of Contacts of a Case

There is no immunization or prophylaxis for contacts of cases. Follow drainage or secretion precautions if the case has draining lesions followed by disinfection of purulent discharges. Licensed brucella vaccines are currently available only for livestock.

C. Managing Special Situations

Reported Incidence Is Higher than Usual/Outbreak Suspected

If more than one case of brucellosis is reported or suspected in your city or town, or if you suspect an outbreak, investigate to determine the source of infection and mode of transmission. A common vehicle, such as unpasteurized milk products or infected animals, should be sought and applicable preventive or control measures should be instituted (*e.g.*, removing an implicated food item from the environment). Consult with the epidemiologist on-call at the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 as soon as possible. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases that may cross several town lines and therefore be difficult to identify at a local level.

Note: Refer to the MDPH's *Foodborne Illness Investigation and Control Reference Manual* for comprehensive information in investigating foodborne illness complaints and outbreaks. (Copies of this manual were distributed to local boards of health in 1997–98. It can also be located on the MDPH website in PDF format at <http://www.magnet.state.ma.us/dph/fpp/refman.htm>.) For recent changes (fall of 2000) to the Massachusetts Food Code, contact the Division of Food and Drugs, Food Protection Program at (617) 983-6712 or through the MDPH website at <http://www.state.ma.us/dph/fpp/>.

Note: If a bioterrorist event is suspected, the MDPH and other response authorities will work closely with local boards of health and provide instructions/information on how to proceed.

Exposure of a Laboratory Worker

Laboratory workers exposed to *Brucella* (*e.g.*, did not use the protection of a laminar air flow/biosafety hood), should consider pursuing one of the 3 following options:

- Do nothing but watch for symptoms (and consult with a healthcare provider if symptoms appear);
- Obtain prophylatic treatment (for 3 weeks with doxycycline and rifampin);
- Obtain an acute serum followed by a convalescent serum 3 weeks later. This third option can be pursued with or without treatment.

Consult with the epidemiologist on-call at the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850.

D. Preventive Measures

Environmental Measures

Implicated food items must be removed from the environment. A decision about removing implicated food items from the environment can be made in consultation with the Division of Food and Drugs (DFD), reachable at (617) 983-6712, or the Division of Epidemiology and Immunization.

Note: The role of the DFD is to provide policy and technical assistance with the environmental investigation such as interpreting the Massachusetts Food Code, conducting a HACCP risk assessment, initiating enforcement actions, and collecting food samples.

Preventive Measures/Education

To prevent future exposures, advise the following:

- Do not consume raw (unpasteurized) milk or milk products (including imported cheeses, etc.).
- Workers at occupational risk (such as farmers, slaughterhouse workers, meat processors or butchers) should know symptoms of the disease, how it is spread, and the risks of handling infected animal carcasses and products. They should know the proper way to reduce exposure, such as ventilating slaughterhouses and handling carcasses carefully. For more information refer to the USDA, Animal and Plant Health Inspection Service (APHIS) website located at <www.aphis.usda.gov:80/msd/manual/ch_077>.
- Hunters should use barrier protection (gloves or clothing) when dressing wild pigs and burying the remains.
- Anyone who handles or disposes of placentas, fetuses, and/or discharges from an animal should use care and disinfect contaminated areas.

Local officials and farmers should search for infection among livestock and eliminate infected animals. In areas of high prevalence, immunization of livestock may be appropriate. Ultimate control of human brucellosis relies on eliminating the disease in domestic animal populations.

ADDITIONAL INFORMATION

The following is the formal Centers for Disease Control and Prevention (CDC) surveillance case definition for brucellosis. It is provided for your information only and should not affect the investigation or reporting of a case that fulfills the criteria in Section 2) A of this chapter. (CDC case definitions are used by the state health department and CDC to maintain uniform standards for national reporting.) For reporting a case to the MDPH always use the criteria outlined in Section 2) A.

Clinical description

An illness characterized by acute or insidious onset of fever, night sweats, undue fatigue, anorexia, weight loss, headache, and arthralgia.

Laboratory criteria for diagnosis

- Isolation of *Brucella* sp. from a clinical specimen, or
- Fourfold or greater rise in *Brucella* agglutination titer between acute- and convalescent-phase serum specimens obtained ≥ 2 weeks apart and studied at the same laboratory, or
- Demonstration by immunofluorescence of *Brucella* sp. in a clinical specimen.

Case classification
Probable: a clinically compatible case that is epidemiologically linked to a confirmed case or that has supportive serology (*i.e.,* Brucella agglutination titer of ≥ 160 in one or more serum specimens obtained after onset of symptoms).

Confirmed: a clinically compatible case that is laboratory confirmed.

REFERENCES

American Academy of Pediatrics. *1997 Red Book: Report of the Committee on Infectious Diseases, 24th Edition.* Illinois, Academy of Pediatrics, 1997.

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CDC Website. Brucellosis. Available at <http://www.cdc.gov/od/oc/media/fact/brucello.htm>. Updated February 2000.

Chin, J., ed., *Control of Communicable Diseases Manual, 17th Edition*. Washington, DC, American Public Health Association, 2000.

MDPH. *Regulation 105 CMR 300.000: Reportable Diseases and Isolation and Quarantine Requirements*. MDPH, Promulgated November 1998 (Printed July 1999).